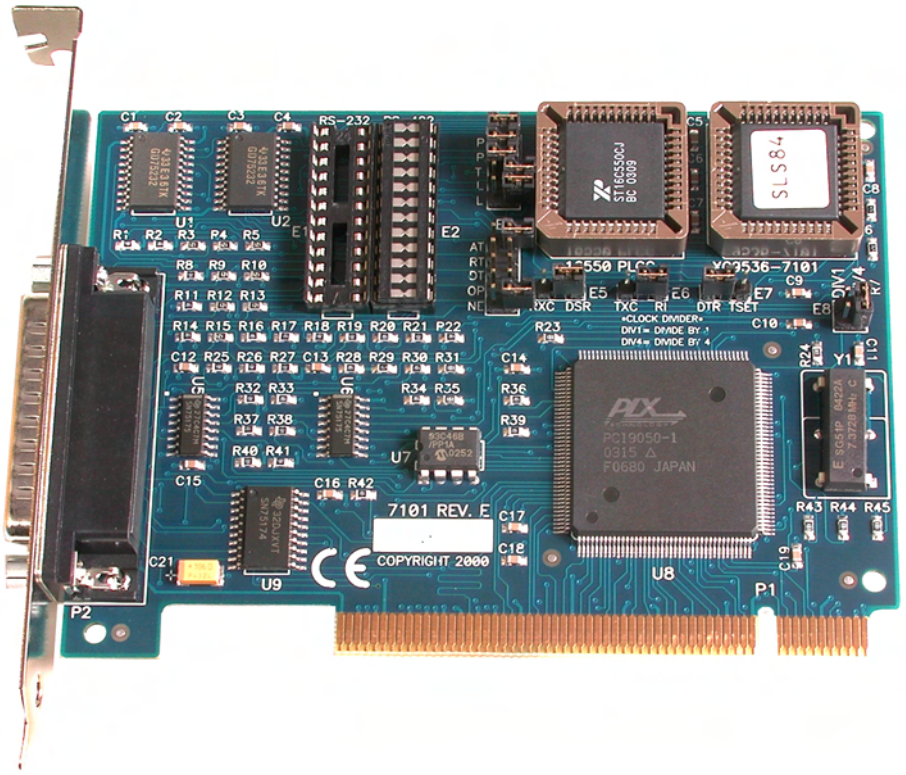
ULTRA 530.PCI
Users Manual



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Introduction

Overview

The Sealevel Systems **ULTRA 530.PCI** is a one channel PCI Bus serial I/O adapter for the PC and compatibles. It provides one field selectable RS-232/422/485/530 serial port supporting asynchronous data rates up to 460.8K bps as well as isochronous data rates up to the speed of the supplied clock. Now, with this card, you can use your standard communications software and connect over a clocked digital communications line.

Configure the port as RS-232 for standard serial COM: port requirements. Choose the RS-422 mode for long distance device connections up to 4000ft. where noise immunity and high data integrity are essential. Select RS-485 and capture data from multiple peripherals in a RS-485 multi-drop network. Up to 31 RS-485 devices can be connected to each port to automate your data collection.

In both RS-232 and RS-422 modes, the card works seamlessly with the standard operating system serial driver. In RS-485 mode, our special auto-enable feature allows the RS-485 ports to be viewed by the operating system as a COM: port. This allows the standard COM: driver to be utilized for RS-485 communications. Our on-board hardware automatically handles the RS-485 driver enable. UART upgrades are available providing 32, 64 and 128 byte FIFOs.

What's Included

The **ULTRA 530.PCI** is shipped with the following items. If any of these items are missing or damaged, contact the supplier.

- **ULTRA 530.PCI** Serial I/O Adapter
- Sealevel SeaCOM Software CD

Card Setup

RS-485 Enable Modes

RS-485 is ideal for multi-drop or network environments. RS-485 requires a tri-state driver that will allow the electrical presence of the driver to be removed from the line. The driver is in a tri-state or high impedance condition when this occurs. Only one driver may be active at a time and the other driver(s) must be tri-stated. The output modem control signal **R**equest **T**o **S**end (RTS) is typically used to control the state of the driver. Some communication software packages refer to RS-485 as RTS enable or RTS block mode transfer.

One of the unique features of the **ULTRA 530.PCI** is the ability to be RS-485 compatible without the need for special software or drivers. This ability is especially useful in Windows, Windows NT, and OS/2 environments where the lower level I/O control is abstracted from the application program. This ability means that the user can effectively use the **ULTRA 530.PCI** in a RS-485 application with existing (i.e. standard RS-232) software drivers.

Header E4 is used to control the RS-485 mode functions for the driver circuit. The selections are:

'Auto' enable (silk-screen 'AT'). The 'Auto' enable feature automatically enables/disables the RS-485 interface via on board circuitry.

'RTS' enable (silk-screen 'RT') The 'RTS' mode uses the 'RTS' modem control signal to enable the RS-485 interface and provides backward compatibility with existing software products.

'DTR' enable (silk-screen 'DT') The 'DTR' mode uses the 'DTR' modem control signal to enable the RS-485 interface, provides backward compatibility with existing software products and with the Oxford Semiconductor 16C950 RS-485 enable feature

'Output One' enable (silk-screen 'OP') This mode uses the 'OP1' control signal to enable the RS-485 interface and provides backward compatibility with existing software products and with the Exar 16C850 RS-485 enable feature

'No Echo' (silk-screen 'NE') of E4 is used to control the RS-485 enable/disable functions for the receiver circuit and determine the state of the RS-422/485 driver. The RS-485 'Echo' is the result of connecting the receiver inputs to the transmitter outputs. Every time a character is transmitted; it is also received. This can be beneficial if the software can handle echoing (i.e. using received characters to throttle the transmitter) or it can confuse the system if the software does not. To select the 'No Echo' mode select silk-screen position 'NE'.

RS-485 Mode Examples (Header E4)

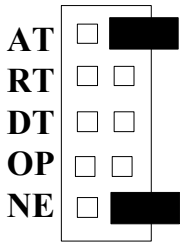


Figure 1- Header E4, RS-422

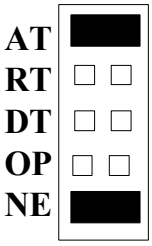


Figure 2 – Header E4, RS-485 'Auto' Enabled, with 'No Echo'

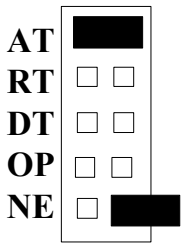


Figure 3 - Header E4, RS-485 'Auto' Enabled, with 'Echo'

RS-485 Mode Examples (Header E4) continued

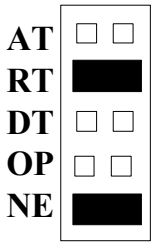


Figure 4 - Header E4, RS-485 'RTS' Enabled, with 'No Echo'

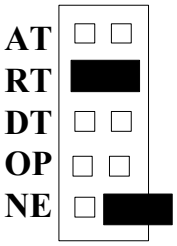


Figure 5 – Header E4, RS-485 'RTS' Enabled, with 'Echo'

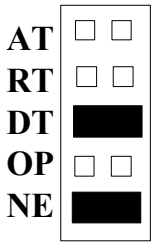


Figure 6 – Header E4, RS-485 'DTR' Enabled, with No Echo

Address and IRQ selection

The **ULTRA 530.PCI** is automatically assigned I/O addresses and IRQs by your motherboard BIOS. Only the I/O address may be modified by the user.

Adding or removing other hardware may change the assignment of I/O addresses and IRQs.

Line Termination

Typically, each end of the RS-485 bus must have line terminating resistors (RS-422 terminates at the receive end only). A 120-ohm resistor is across each RS-422/485 input in addition to a 1K ohm pull-up/pull-down combination that biases the receiver inputs. Header E4 allows customization of this interface to specific requirements. Each jumper position corresponds to a specific portion of the interface. If multiple **ULTRA 530.PCI** adapters are configured in a RS-485 network, only the boards on each end should have jumpers T, P & P **ON.** Refer to the following table for each position's operation:

Name	Function
P	Adds or removes the 1K ohm pull-down resistor in the RS-422/RS-485 receiver circuit (Receive data only).
P	Adds or removes the 1K ohm pull-up resistor in the RS-422/RS-485 receiver circuit (Receive data only).
T	Adds or removes the 120 ohm termination.
L	Connects the TX+ to RX+ for RS-485 two wire operation.
L	Connects the TX- to RX- for RS-485 two wire operation.

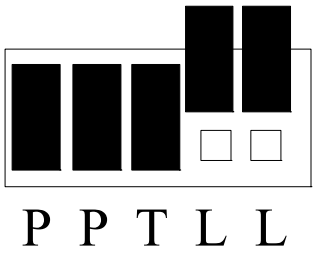


Figure 7 - Headers E3, Line Termination

Electrical Interface Selection

Each port on the **ULTRA 530.PCI** has the ability to be used in either RS-232 or RS-422/485. This is selectable via four 24 pin DIP-shunts at E1-E4. Please use the following illustration to aid in the configuration of your electrical interface.

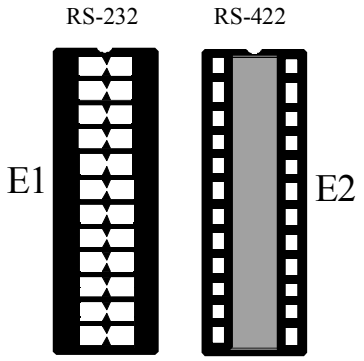


Figure 8 - Headers E1 & E2, RS-232 Selected

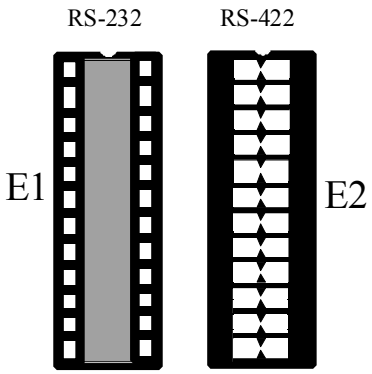


Figure 9 - Headers E1 & E2, RS-422/485 Selected

Clock Modes

The **ULTRA 530.PCI** employs a unique clocking option that allows the end user to select from divide by 4 and divide by 1 clocking modes. These modes are selected at Header E8.

To select the Baud rates commonly associated with COM: ports (i.e. 2400, 4800, 9600, 19.2, … 115.2K Bps) place the jumper in the divide by 4 mode (silk-screen DIV4).

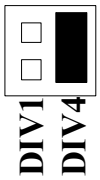


Figure 10 - Clocking Mode 'Divide By 4'

To select the maximum data rate (460.8K bps) place the jumper in the divide by 1 (silk-screen DIV1) position.

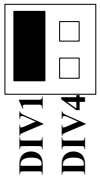


Figure 11 - Clocking Mode 'Divide By 1'

Baud Rates and Divisors for the 'Div1' mode

The following table shows some common data rates and the rates you should choose to match them if using the adapter in the 'Div1' mode.

For this Data Rate	Choose this Data Rate
1200 bps	300 bps
2400 bps	600 bps
4800 bps	1200 bps
9600 bps	2400 bps
19.2K bps	4800 bps
57.6 K bps	14.4K bps
115.2 K bps	28.8K bps
230.4K bps	57.6 K bps
460.8K bps	115.2 K bps

If your communications package allows the use of Baud rate divisors, choose the appropriate divisor from the following table:

For this Data Rate	Choose this Divisor
1200 bps	384
2400 bps	192
4800 bps	96
9600 bps	48
19.2K bps	24
38.4K bps	12
57.6K bps	8
115.2K bps	4
230.4K bps	2
460.8K bps	1

Isochronous Clocking Jumpers

The Oxford Semiconductor 16C950 allows for the reception of both the transmit and the receive clocks for isochronous communications (for a discussion on isochronous clocking refer to the Technical Description section). The three headers that allow the selection of either a modem control signal or the clock option are E5, E6 and E7. The following examples describe each setting.

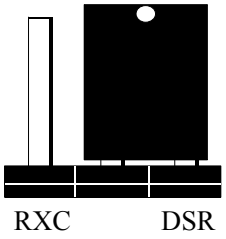


Figure 12 – Header E5, Modem Control Signal DSR selected as input

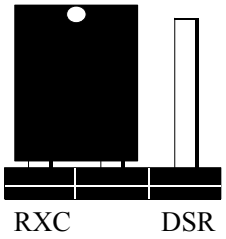


Figure 13 - Header E5, Clock Signal RXC selected as input

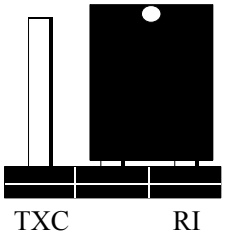


Figure 14 - Header E6, Modem Control Signal RI selected as input

Isochronous Clocking Jumpers (continued)

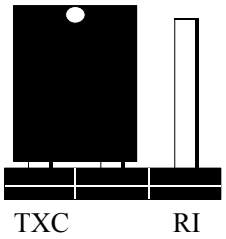


Figure 15 - Header E6, Clock Signal TXC selected as input

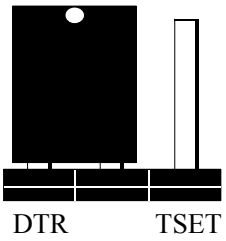


Figure 16 - Header E7, Modem Control Signal DTR selected as output

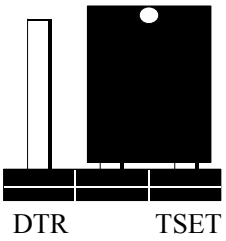


Figure 17 - Header E7, Clock Signal TSET selected as output

Installation

Operating System Installation

Windows 95/98/ME/NT/2000/XP

Do not install the Adapter in the machine until the software has been fully installed.

1. Start Windows.
2. Insert the Sealevel Systems CD in to your CD drive.
3. If 'Auto-Start' is enabled for this drive the software will automatically launch. Otherwise, point your browser to the 'Index.htm' on the root directory of the CD
4. Select 'Install Software'.
5. Select the Part Number for your adapter from the listing.
6. Select 'Windows 98/ME/2000/XP'. The setup file will automatically detect the operating environment and install the proper components. Next (depending on the OS version) select the 'Run this program from its current location' or 'Open' option. Follow the information presented on the screens that follow.
7. A screen may appear with the declaration: "The publisher cannot be determined due to the problems below: Authenticode signature not found." Please select the 'Yes' button and proceed with the installation. This declaration simply means that the Operating System is not aware of the driver being loaded. It will not cause any harm to your system.
8. During setup the user may specify installation directories and other preferred configurations. This program also adds entries to the system registry that are necessary for specifying the operating parameters for each driver. An uninstall option is also included to remove all registry/INI file entries from the system.

Linux

Refer to D:\software\seacom\Other\Linux**Linux.serial.readme** (where D: = your CDROM driver letter) found on the Sealevel Systems CD. This file contains valuable information on installing your adapter in the various Linux releases. Also in this sub-directory is the **Linux SerialHOWTO.** This series of files explains typical Linux serial implementations, as well as informing the user to Linux syntax and preferred practices.

QNX

Refer to D:\software\seacom\Other\QNX6**Install.readme** (where D: = your CDROM driver letter) found on the Sealevel Systems CD. This file contains valuable information on installing your adapter in the QNX6 Neutrino OS, as well as the files required to ensure a flawless implementation. Also provided on the Sealevel Systems CD are implementation instructions for QNX4. These are found in D:\software\seacom\Other\QNX4**QNX_COM.txt.**

Physical Installation

The adapter can be installed in any 5V PCI expansion slot and contains several jumper straps for each port that must be set for proper.

Do not install the Adapter in the machine until the software has been fully installed.

1. **Turn off PC power. Disconnect the power cord.**
2. Remove the PC case cover.
3. Locate an available PCI slot and remove the blank metal slot cover.
4. Gently insert the PCI adapter into the slot. Make sure that the adapter is seated properly.
5. Replace the screw. (This is required to ensure FCC Part 15 compliance.)
6. Replace the cover.
7. Connect the power cord

Installation is finished.

Technical Description

The Sealevel Systems **ULTRA 530.PCI** provides a PCI interface adapter with an additional asynchronous serial port providing a versatile interface, field selectable as RS-232 for modems, printers and plotters, as well as RS-422/485/530 for industrial automation and control applications.

The **ULTRA 530.PCI** utilizes the 16550 UART. This chip features programmable baud rates, data format, interrupt control and a 16-byte input and output FIFO. Also available, as options, are the 16C650, 16C750 and 16C850 UART's that provide deeper FIFO's (32, 64, 128 bytes respectively).

One other unique feature of the **ULTRA 530.PCI** is the support for the Oxford Semiconductor 16C950. This chip features a deep FIFO (128 bytes transmit and receive), automatic RS-485 driver enable, and the ability to receive a clock for isochronous communications.

Isochronous Communications

Webster's New Collegiate Dictionary defines *synchronous* as "recurring or operating at exactly the same period." The majority of the serial buses in use today operate *asynchronously*, that is, "not synchronous" or more literally, not clocked. The same dictionary defines *isochronous* as "uniform in time; having equal duration; and recurring at regular intervals." In this implementation of serial communications, isochronous is defined as asynchronous framing (i.e. start, stop and parity bits) with the addition of a clock signal. This scheme allows for much higher data rates and the use of digital lines (i.e. ISDN, T1) where a clock is supplied for data multiplexing.

Why is this exciting? Now, with a simple communications interface that responds to standard communication calls, high-speed communications can be accomplished! For example: Company A wishes to send daily reports from the London office to it's New York office via an established satellite link. These links typically require a clock to synchronize data. In the past, more expensive synchronous interface adapter and custom software would be required. Now, utilizing the **ULTRA 530.PCI** interface adapter with the Oxford Semiconductor 16C950 UART, an off the shelf product such as PROCOMM PLUS32 or Symantec's PCANYWHERE32 can be utilized, at much higher data rates than are possible via dialup services.

Connector Pin Assignments

RS-232 Signals

Signal	Name	Pin #	Mode
GND	Ground	7	
RD	Receive Data	3	Input
CTS	Clear To Send	5	Input
DSR	Data Set Ready	6	Input
TXC	Transmit Clock	15	Input
RXC	Receive Clock	17	Input
DCD	Data Carrier. Detect	8	Input
RI	Ring Indicator	22	Input
TD	Transmit Data	2	Output
RTS	Request to Send	4	Output
TSET	Transmit Signal Element Timing	24	Output
DTR	Data Terminal Ready	20	Output

RS-422/485/530 Pin Assignments

Signal		Name	Pin #	Mode
GND		Ground	7	
RDB	RX+	Receive Positive	16	Input
RDA	RX-	Receive Negative	3	Input
CTSB	CTS+	Clear To Send Positive	13	Input
CTSA	CTS-	Clear To Send Negative	5	Input
DSRB	DSR+	Data Set Ready Positive	22	Input
DSRA	DSR-	Data Set Ready Negative	6	Input
DCDB	DCD+	Data Carrier Detect Positive	10	Input
DCDA	DCD	Data Carrier Detect Negative	8	Input
TDB	TX+	Transmit Positive	14	Output
TDA	TX-	Transmit Negative	2	Output
RTSB	RTS+	Request To Send Positive	19	Output
RTSA	RTS-	Request To Send Negative	4	Output
DTRB	DTR+	Data Terminal. Ready Positive	23	Output
DTRA	DTR-	Data Terminal Ready Negative	20	Output
TXCB	TXC+	Transmit Clock Positive	12	Input
TXCA	TXC-	Transmit Clock Negative	15	Input
RXCB	RXC+	Receive Clock Positive	9	Input
RXCA	RXC-	Receive Clock Negative	17	Input
TSETB	TSET+	Terminal Timing Positive	11	Output
TSETA	TSET-	Terminal Timing Negative	24	Output

Note: These assignments meet the EIA/TIA/ANSI-530 DTE specification with the exception of Ring Indicator which is not specified. It has been included here for compatibility with systems requiring Ring Indicator. Always terminate any unused signals. This allows for maximum data thru-put.

Specifications

Environmental Specifications

Specification	Operating	Storage
Temperature Range	0º to 70º C (32º to 158º F)	-50º to 105º C (-58º to 221º F)
Humidity Range	10 to 90% R.H. Non-Condensing	10 to 90% R.H. Non-Condensing

Manufacturing

All Sealevel Systems Printed Circuit boards are built to UL 94V0 rating and are 100% electrically tested. These printed circuit boards are solder mask over bare copper or solder mask over tin nickel.

Power Consumption

Supply line	+12VDC	-12VDC	+5 VDC
Rating	50 mA	50 mA	480 mA

Physical Dimensions

Board length	4.9 inches	(12.446 cm)
Board Height including Goldfingers	3.5 inches	(8.89 cm)
Board Height excluding Goldfingers	3.175 inches	(8.064 cm)

Appendix A - Troubleshooting

Sealevel Software is supplied with the Sealevel Systems adapter and may be used in the troubleshooting procedures. Using this software and following these simple steps can eliminate most common problems without the need to call Technical Support.

1. Identify all I/O adapters currently installed in your system. This includes your on-board serial ports, controller cards, sound cards etc. The I/O addresses used by these adapters, as well as the IRQ (if any) should be identified.

2. Configure your Sealevel Systems adapter so that there is no conflict with currently installed adapters. No two adapters can occupy the same I/O address.

3. Make sure the Sealevel Systems adapter is using a unique IRQ. While the Sealevel Systems adapter does allow the sharing of IRQs, many other adapters (i.e. SCSI adapters & on-board serial ports) do not. The IRQ is typically selected by the BIOS or Operating system. Some BIOS setup software will allow changing the IRQ, but others do not. Another method of changing assigned resources is to try changing PCI slots. This will typically cause the BIOS or OS to reassign the resources.

4. Make sure the Sealevel Systems adapter is securely installed in a motherboard slot.

5. When running DOS or Windows 3.x refer to the supplied Sealevel Software and this User Manual to verify that the Sealevel Systems adapter is configured correctly. This software contains a diagnostic program 'SSD' (D:\software\seacom\Other\DOS\DIAG, where D: = the driver letter of your CDROM drive) will verify if an adapter is configured properly. This diagnostic program is written with the user in mind and is easy to use. You can use D:\software\seacom\Other\DOS\PCI\FindPCI.exe to determine resources that have been assigned to your adapter. Make sure that if available, the 'Use Plug-n-Play" option is turned **'OFF'** in your BIOS. Having this option set to **'ON**' in DOS or Windows 3.x will cause erratic operations.

6. For Windows95/98/ME/NT/2000, the diagnostic tool 'WinSSD' is installed in the SeaCOM folder on the Start Menu during the setup process. First find the ports using the Device Manager, then use 'WinSSD' to verify that the ports are functional.

7. Remember that a loopback test is not possible with the 'NE' jumper in place.

8. Always use the Sealevel Systems diagnostic software when troubleshooting a problem. This will eliminate any software issues from the equation.

Appendix B - How To Get Assistance

Please refer to Troubleshooting Guide prior to calling Technical Support.

1. Begin by reading through the Trouble Shooting Guide in Appendix A. If assistance is still needed please see below.
2. When calling for technical assistance, please have your user manual and current adapter settings. If possible, please have the adapter installed in a computer ready to run diagnostics.
3. Sealevel Systems provides an FAQ section on its web site. Please refer to this to answer many common questions. This section can be found at http://www.sealevel.com/faq.asp.
4. Sealevel Systems maintains a web page on the Internet. Our home page address is http://www.sealevel.com. The latest software updates, and newest manuals are available via our web site.
5. Technical support is available Monday to Friday from 8:00 a.m. to 5:00 p.m. eastern time. Technical support can be reached at (864) 843-4343.

Return Authorization Must Be Obtained From Sealevel Systems Before Returned Merchandise Will Be Accepted. Authorization Can Be Obtained By Calling Sealevel Systems And Requesting A Return Merchandise Authorization (RMA) Number.

Appendix C - Electrical Interface

RS-232

Quite possibly the most widely used communication standard is RS-232. This implementation has been defined and revised several times and is often referred to as RS-232 or EIA/TIA-232. RS-232 is capable of operating at data rates up to 20 Kbps at distances less than 50 ft. The absolute maximum data rate may vary due to line conditions and cable lengths. RS-232 is a single ended or unbalanced interface, meaning that a single electrical signal is compared to a common signal (ground) to determine binary logic states. The RS-232 and the EIA/TIA-574 specification define two types of interface circuits, Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE). The **ULTRA 530.PCI** is a DTE device.

RS-422

The RS-422 specification defines the electrical characteristics of balanced voltage digital interface circuits. RS-422 is a differential interface that defines voltage levels and driver/receiver electrical specifications. On a differential interface, logic levels are defined by the difference in voltage between a pair of outputs or inputs. In contrast, a single ended interface, for example RS-232, defines the logic levels as the difference in voltage between a single signal and a common ground connection. Differential interfaces are typically more immune to noise or voltage spikes that may occur on the communication lines. Differential interfaces also have greater drive capabilities that allow for longer cable lengths. RS-422 is rated up to 10 Megabits per second and can have cabling 4000 feet long. RS-422 also defines driver and receiver electrical characteristics that will allow 1 driver and up to 32 receivers on the line at once. RS-422 signal levels range from 0 to +5 volts. RS-422 does not define a physical connector.

RS-485

RS-485 is backwardly compatible with RS-422; however, it is optimized for partyline or multi-drop applications. The output of the RS-422/485 driver is capable of being **Active** (enabled) or **Tri-State** (disabled). This capability allows multiple ports to be connected in a multi-drop bus and selectively polled. RS-485 allows cable lengths up to 4000 feet and data rates up to 10 Megabits per second. The signal levels for RS-485 are the same as those defined by RS-422. RS-485 has electrical characteristics that allow for 32 drivers and 32 receivers to be connected to one line. This interface is ideal for multi-drop or network environments. RS-485 tri-state driver (not dual-state) will allow the electrical presence of the driver to be removed from the line. Only one driver may be active at a time and the other driver(s) must be tri-stated. RS-485 can be cabled in two ways, two wire and four wire mode. Two wire mode does not allow for full duplex communication, and requires that data be transferred in only one direction at a time. For half-duplex operation, the two transmit pins should be connected to the two receive pins (Tx+ to Rx+ and Tx- to Rx-). Four wire mode allows full duplex data transfers. RS-485 does not define a connector pin-out or a set of modem control signals. RS-485 does not define a physical connector.

RS-530

RS-530 (a.k.a. EIA-530) compatibility means that RS-422 signal levels are met, and the pin-out for the DB-25 connector is specified. The EIA (Electronic Industry Association) created the RS-530 specification to detail the pin-out, and define a full set of modem control signals that can be used for regulating flow control and line status. The RS-530 specification defines two types of interface circuits, Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE). The Sealevel Systems adapter is a DTE interface.

Appendix D - Asynchronous Communications

Serial data communications implies that individual bits of a character are transmitted consecutively to a receiver that assembles the bits back into a character. Data rate, error checking, handshaking, and character framing (start/stop bits) are pre-defined and must correspond at both the transmitting and receiving ends.

Asynchronous communications is the standard means of serial data communication for PC compatibles and PS/2 computers. The original PC was equipped with a communication or COM: port that was designed around an 8250 Universal Asynchronous Receiver Transmitter (UART). This device allows asynchronous serial data to be transferred through a simple and straightforward programming interface. A start bit, followed by a pre-defined number of data bits (5, 6, 7, or 8) defines character boundaries for asynchronous communications. The end of the character is defined by the transmission of a pre-defined number of stop bits (usually 1, 1.5 or 2). An extra bit used for error detection is often appended before the stop bits.

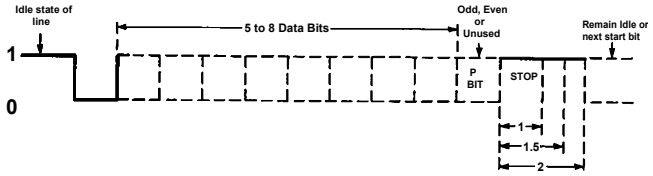
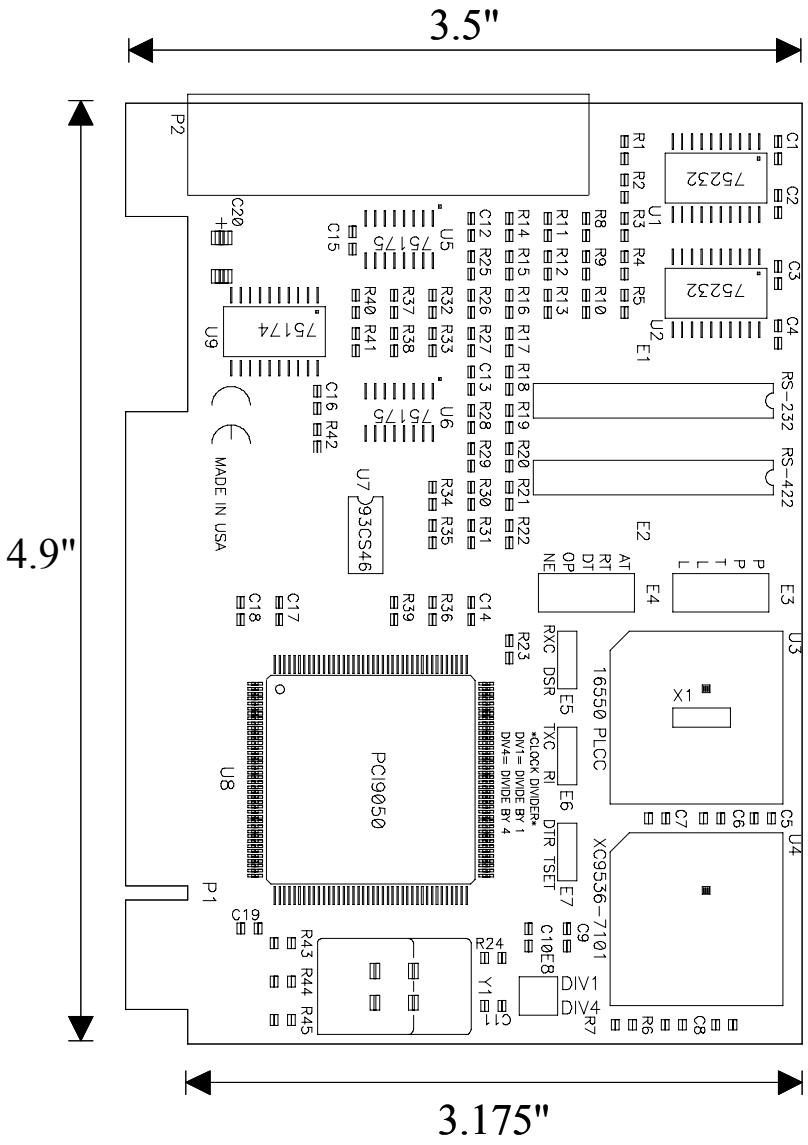


Figure 18 - Asynchronous Communications Bit Diagram

This special bit is called the parity bit. Parity is a simple method of determining if a data bit has been lost or corrupted during transmission. There are several methods for implementing a parity check to guard against data corruption. Common methods are called (E)ven Parity or (O)dd Parity. Sometimes parity is not used to detect errors on the data stream. This is refereed to as (N)o parity. Because each bit in asynchronous communications is sent consecutively, it is easy to generalize asynchronous communications by stating that each character is wrapped (framed) by pre-defined bits to mark the beginning and end of the serial transmission of the character. The data rate and communication parameters for asynchronous communications have to be the same at both the transmitting and receiving ends. The communication parameters are baud rate, parity, number of data bits per character, and stop bits (i.e. 9600, N, 8, 1).

Appendix E - Silk-Screen



Appendix F - Compliance Notices

Federal Communications Commission Statement

FCC - This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in such case the user will be required to correct the interference at the users expense.

EMC Directive Statement

Products bearing the CE Label fulfill the requirements of the EMC directive (89/336/EEC) and of the low-voltage directive (73/23/EEC) issued by the European Commission.

To obey these directives, the following European standards must be met:

EN55022 Class A - "Limits and methods of measurement of radio interference characteristics of information technology equipment"

EN55024 – "Information technology equipment Immunity characteristics Limits and methods of measurement".

EN60950 (IEC950) - "Safety of information technology equipment, including electrical business equipment"

Warning

This is a Class A Product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures to prevent or correct the interference.

Always use cabling provided with this product if possible. If no cable is provided or if an alternate cable is required, use high quality shielded cabling to maintain compliance with FCC/EMC directives.

Warranty

Sealevel's commitment to providing the best I/O solutions is reflected in the Lifetime Warranty that is standard on all Sealevel manufactured products. We are able to offer this warranty due to our control of manufacturing quality and the historically high reliability of our products in the field. Sealevel products are designed and manufactured at its Liberty, South Carolina facility, allowing direct control over product development, production, burn-in and testing.

Sealevel Systems, Inc. (hereafter "Sealevel") warrants that the Product shall conform to and perform in accordance with published technical specifications and shall be free of defects in materials and workmanship for life. In the event of failure, Sealevel will repair or replace the product at Sealevel's sole discretion. Failures resulting from misapplication or misuse of the Product, failure to adhere to any specifications or instructions, or failure resulting from neglect or abuse are not covered under this warranty.

Warranty service is obtained by delivering the Product to Sealevel and providing proof of purchase. **Return authorization must be obtained from Sealevel Systems before returned merchandise will be accepted. Authorization is obtained by calling Sealevel Systems and requesting a Return Merchandise Authorization (RMA) number.** The Customer agrees to insure the Product or assume the risk of loss or damage in transit, to prepay shipping charges to Sealevel, and to use the original shipping container or equivalent. Warranty is valid only for original purchaser and is not transferable.

Sealevel Systems assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Sealevel Systems will not be liable for any claim made by any other related party.

This warranty applies to Sealevel manufactured Product. Product purchased through Sealevel but manufactured by a third party will retain the original manufacturer's warranty.

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Monday - Friday

Trademarks

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